We claim:

1. A [[D]]detector for varying pressure ranges in a specimen chamber of a particle beam device, wherein the detector is arranged and adapted for the detection of electrons and ~~also for the detection of~~ light.

2. The [[D]]detector according to claim 1, wherein the detector comprises a scintillator ~~(3)~~ to which a high voltage potential is appliable, and a photodetector ~~(1)~~, and the scintillator ~~(3) is made~~ being made at least partially permeable to light.

3. The [[D]]detector according to claim 2, wherein the scintillator ~~(3) has~~ comprises an electrically conductive coating in grid or strip form.

4. The [[D]]detector according to claim 2, wherein the scintillator ~~(3) has~~ comprises an electrically conductive coating ~~which~~ that is permeable to light.

5. The [[D]]detector according to ~~one of claims 1-4~~ claim 1, ~~wherein~~ further comprising a light guide ~~(2) is provided~~.

6. The [[D]]detector according to claim 5, wherein the light guide ~~(2) consists of~~ comprises scintillator material.

7. The [[D]]detector according to ~~one of claims 2-5~~ claim 2, ~~wherein a~~ further comprising a collector electrode ~~(5) is provided,~~ connected before the scintillator.

8. The [[D]]detector according to claim 7, wherein the scintillator ~~(3)~~ and the collector electrode ~~(5) can have controllable potentials applied~~ are controllable potentials, independently of each other.

9. The [[D]]detector according to claim 7 ~~or 8~~, wherein the collector electrode ~~(5) can have a variable potential applied~~ is arranged and adapted for application of a variable potential, positive with respect to the sample potential.

10. The [[D]]detector according to ~~one of claims 7-9~~ claim 7, wherein ~~current amplifiers are connected to the collector grid (5) and/or to the conductive coating (4) of the scintillator(3)~~ the scintillator comprises a conductive coating, further comprising current amplifiers that are connected to at least one of the collector grid and to the conductive coating of the scintillator.

11. The [[D]]detector according to ~~one of claims 8-10~~ claim 8, wherein the conductive coating ~~(4)~~ of the scintillator ~~(3) is arranged and adapted to have~~ has a potential applied with respect to the collector electrode ~~(5)~~ so that a gas cascade arises between the collector electrode ~~(5)~~ and the conductive coating ~~(4)~~.

12. The [[D]]detector according to ~~one of claims 1-11~~ claim 1, ~~wherein~~ further comprising a ~~an~~ needle electrode ~~(24)~~ or an electrode of thin wires ~~is provided~~ on ~~the~~ a sample side of the scintillator.

13. The [[D]]detector according to ~~one of claims 1-12~~ claim 1, ~~wherein an electrode (20, 22) surrounding the scintillator~~ further comprising a scintillator and an electrode surrounding the scintillator ~~is provided~~ in a form of a pot ~~which~~ that tapers conically to a point on ~~the~~ a side remote from the scintillator and ~~has~~ comprises an opening ~~(21, 23)~~ on ~~the~~ a side remote from the scintillator.

14. A [[P]]particle beam device, particularly a scanning electron microscope, ~~with~~ comprising a sample chamber ~~(29), the chamber pressure of which is variable~~ with a variable pressure, ~~with~~ an electron optical system for ~~the~~ production of a focused electron beam (PE) and ~~with~~ a detector according to ~~one of claims 1-13~~ claim 1.

15. The [[P]]particle beam device according to claim 14, further comprising a pressure meter ~~(12) is provided~~ in the sample chamber ~~and~~ so that the application of potential to the scintillator takes place in dependence on the pressure in the sample chamber ~~(29)~~.

16. The [[P]]particle beam device according to claim 15, ~~wherein~~ that is arranged and adapted so that at pressures in the sample chamber below a changeover pressure between 10^{-3} hPa and 10^{-2} hPa, a potential of greater than 1 kV positive with respect to the potential of the sample is applied to the scintillator, and at pressures in the sample chamber above the changeover pressure, a potential quantitatively smaller than 1 kV, ~~preferably smaller than 0.5 kV~~, positive with respect to the potential of the sample is applied to the scintillator.

17. The [[P]]particle beam device according to claim 15 ~~or 16~~, wherein the sign of the potential of the collector electrode ~~may be reversed~~ is reversible.

18. The [[P]]particle beam device according to claim 16 ~~or 17~~, ~~wherein~~ that is arranged and adapted so that at pressures above the changeover pressure in the sample chamber, a potential of 0 V or ±400 V with respect to the potential of the sample is applied to the collector electrode.

19. A [[M]]method for the detection of the products of reciprocal effects in a particle beam device under variable pressure conditions, ~~wherein~~ comprising the step that under high vacuum conditions the light arising when the products of interaction strike a scintillator, and the step that at ambient pressure or low vacuum conditions, the light arising when the products of interaction interact with gas molecules, are detected with the same photodetector ~~(1)~~ and then evaluated.

20. The [[M]]method according to claim 19, ~~wherein~~ comprising the step of using a detector according to ~~one of claims 1-13 is used~~ claim 1.

21. (New) The particle beam device according to claim 16, wherein the potential is quantitatively smaller than 0.5 kV.